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VEX IQ CHALLENGE

RISE ABOVE

2020 - 2021

Game Manual

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Section 1
The Game

Game Description

Matches are played on a *Field* set up as illustrated in the figures throughout. The *Robot Skills Challenge* and the *Teamwork Challenge* use the exact same setup for the *Field Elements*, but the Game Elements are arranged differently.

In the *Teamwork Challenge*, an *Alliance* of two (2) *Robots*, operating under driver control, work together in each *Match*.

In the *Robot Skills Challenge*, one (1) *Robot* attempts to score as many points as possible. These *Matches* consist of *Driving Skills Matches*, which will be entirely *Driver Controlled*, and *Programming Skills Matches*, which will be *Autonomous* with limited human interaction.

The object of the game is to attain the highest score by Scoring and Stacking *Risers* in *Goals*, Completing *Rows*, and Completing Stacks

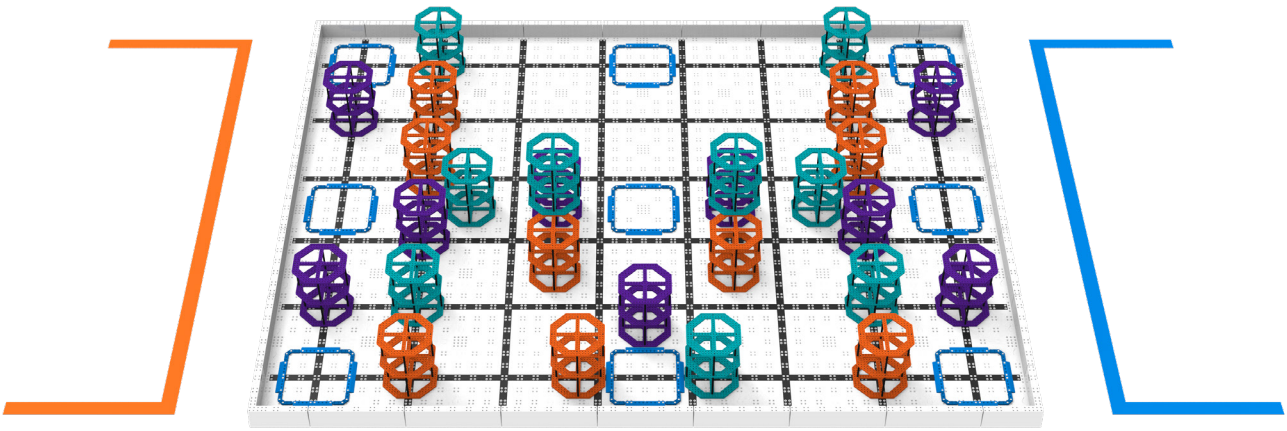


Figure 1: *Starting configuration of the* ***Field*** *for a VEX IQ Challenge Rise Above* ***Match****.*

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Each VEX IQ Challenge Rise Above *Match* includes the following game elements:

- Twenty-seven (27) *Risers*
  - Nine (9) Orange *Risers*
  - Nine (9) Purple *Risers*
  - Nine (9) Teal *Risers*

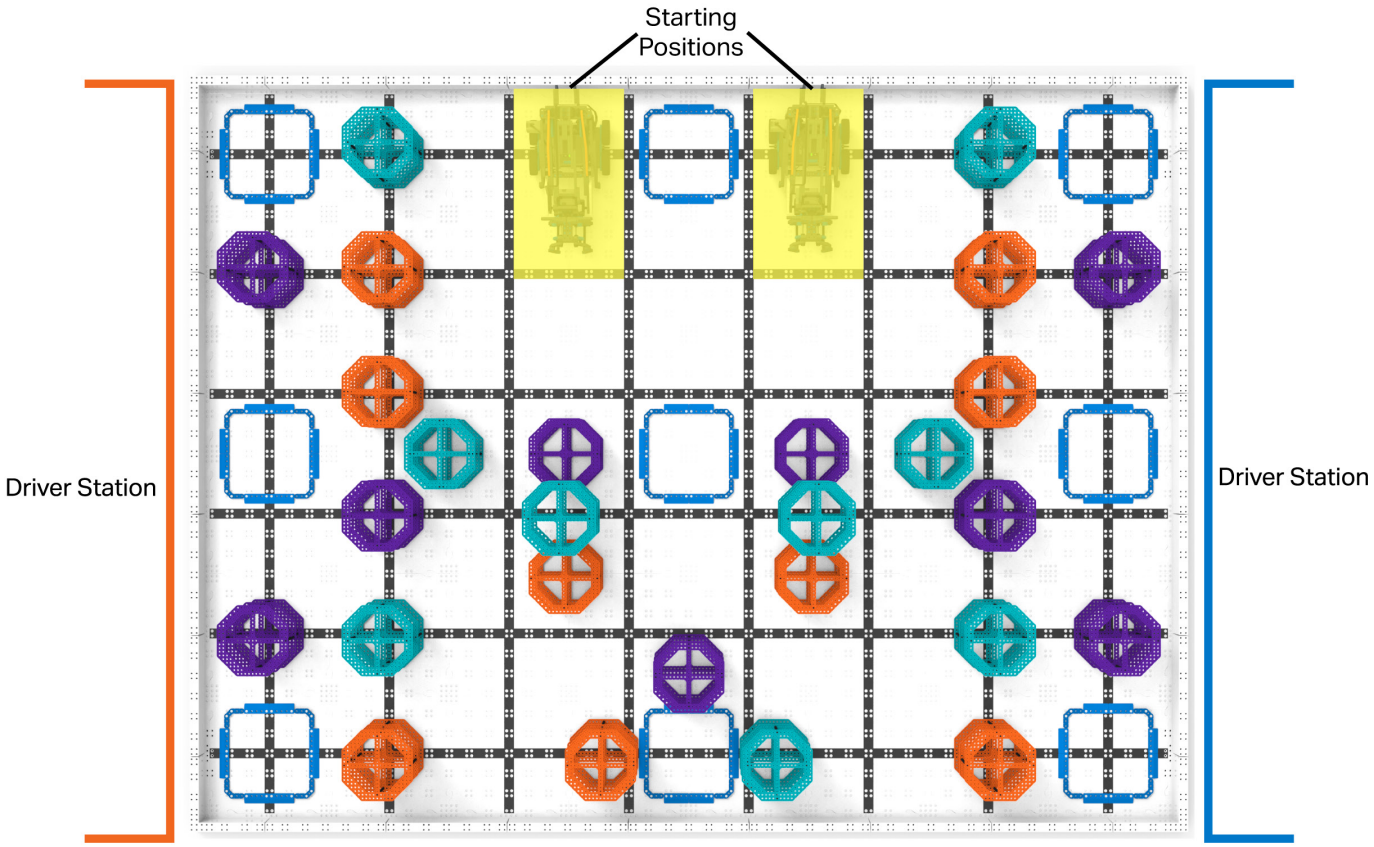


Figure 2: *Overhead view of the* ***Field*** *for a* ***Teamwork Match****. The* ***Driver Stations*** *and* ***Starting Positions*** *are highlighted.*

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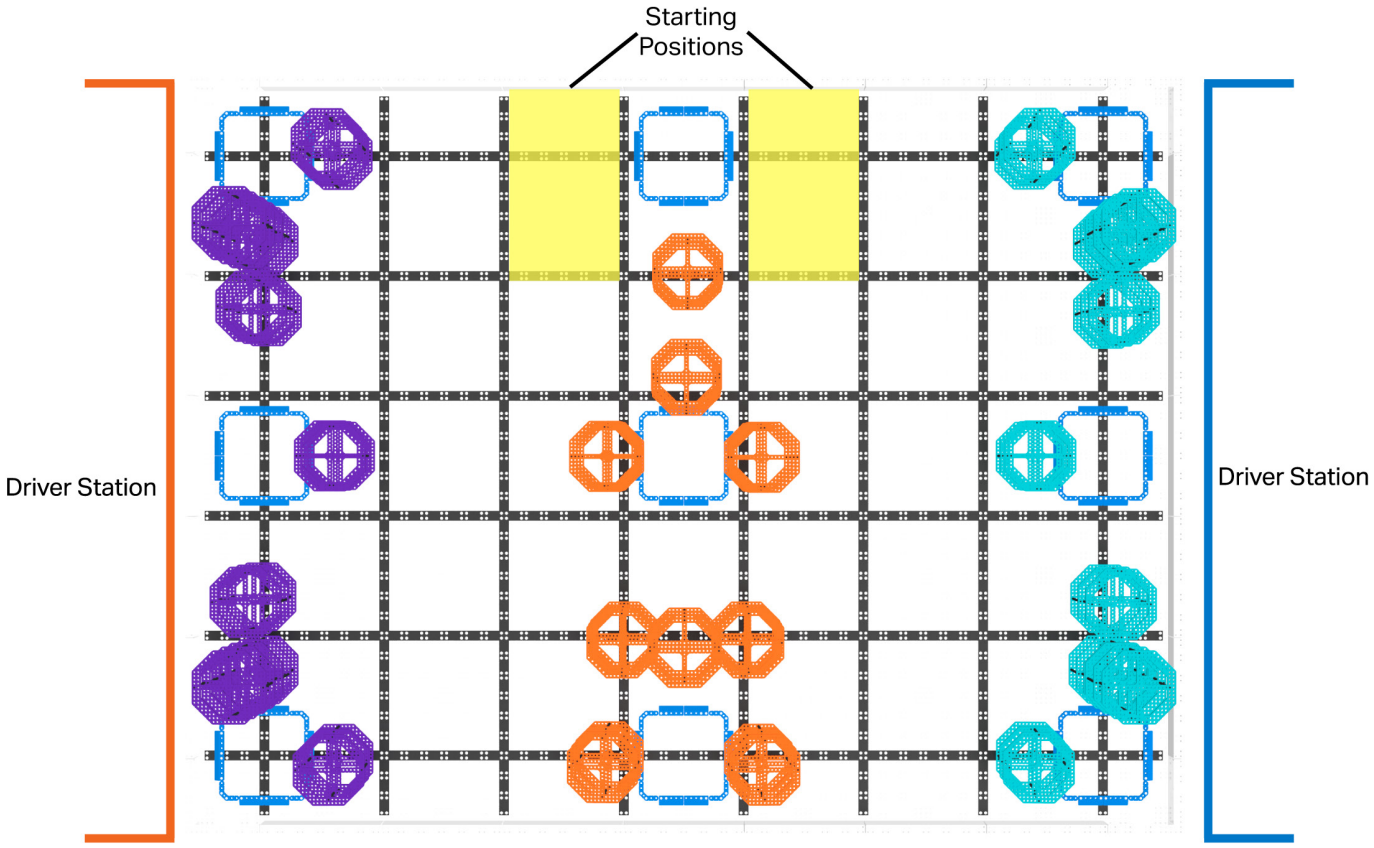


Figure 3: *Overhead view of the* ***Field*** *for a Robot Skills Match. The* ***Robot Starting Positions*** *are highlighted.*

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Game Definitions

Adult – Anyone who is not a *Student*.

Alliance – A pre-assigned grouping of two (2) *Teams* that are paired together during a given *Teamwork Match*.

Alliance Score – Points scored in a *Teamwork Match* awarded to both *Teams*.

Autonomous – A *Robot* that is operating and reacting only to sensor inputs and to commands pre-programmed by the *Students* into the Robot control system. The *Robot* is operating without input from a VEX IQ Controller.

Builder– The *Student*(s) on the team who assemble(s) the *Robot*. An *Adult* cannot be the *Builder* on a *Team*. *Adults* are permitted to teach the *Builder* associated concepts, but may never be working on the *Robot* without the *Builder* present and actively participating.

Completed Row – A *Row* Status. A *Completed Row* is when all three (3) *Goals* in the *Row* have at least one Scored *Riser* and all Scored *Risers* in the *Row* are of uniform color.

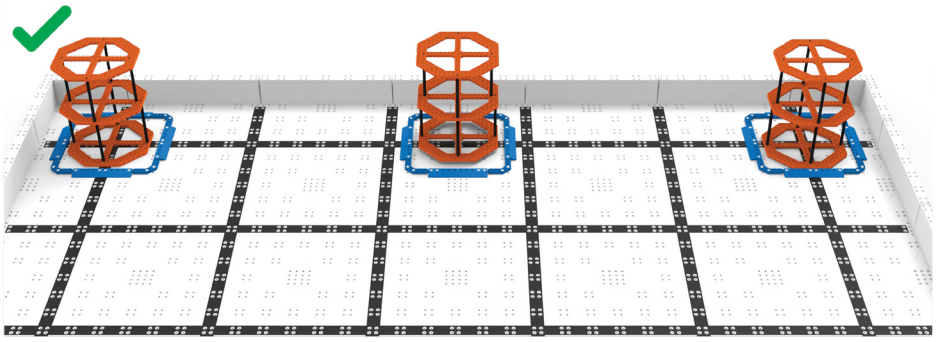


Figure 4: *A Completed Row*

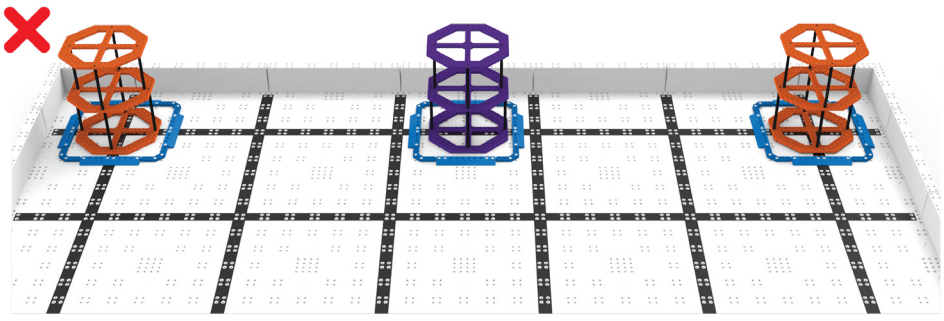


Figure 5: *A Non-Completed* ***Row***

Completed Stack - A *Goal* Status. A *Completed Stack* is when the *Goal* is part of a *Completed Row* and has exactly three (3) Scored *Risers*. Each *Goal* can only count as one (1) *Completed Stack*.

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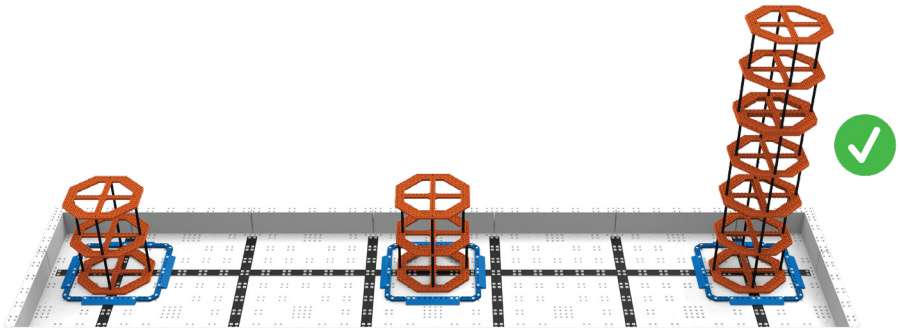


Figure 6: A Completed Stack

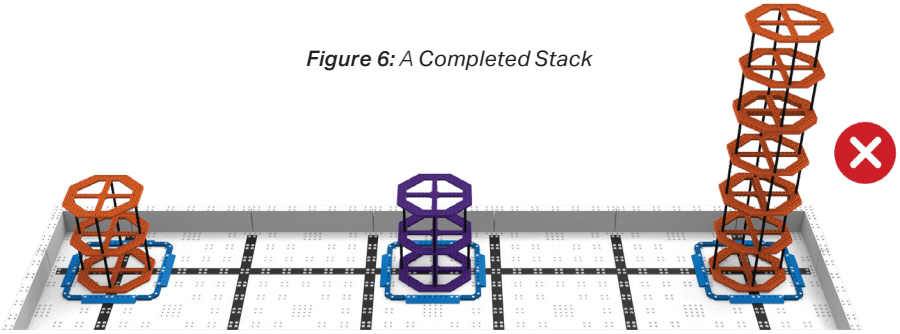


Figure 7: A Non-Completed Stack and a Non-Completed Row

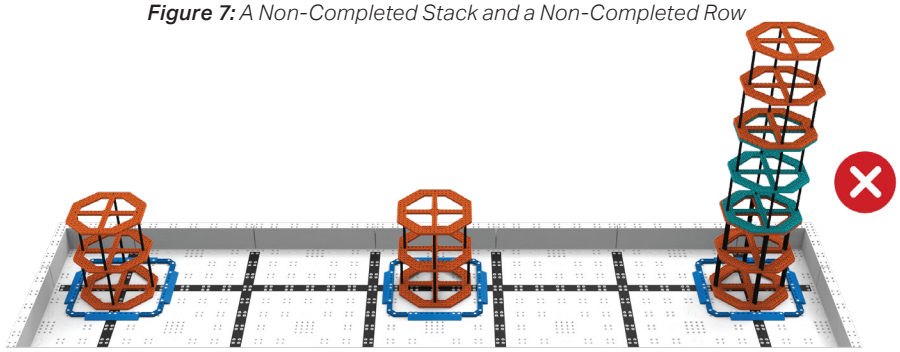


Figure 8: A Non-Completed Stack and a Non-Completed Row

Designer – The *Student*(s) on the *Team* who design(s) the *Robot* to be built for competition. An *Adult* cannot be the *Designer* on a *Team*. *Adults* are permitted to teach the *Designer* associated concepts, but may never be working on the design of the *Robot* without the *Designer* present and actively participating.

Disablement – A penalty applied to a *Team* for a rule violation. During *Disablement*, a *Team* is no longer allowed to operate their *Robot*, and the *Drivers* will be asked to place their Controller on the ground. A *Disablement* is not the same as a *Disqualification*.

Disqualification – A penalty applied to a *Team* for a rule violation (see <T11> for more details). If a *Team* is Disqualified in a *Match*, the *Head Referee* will notify the *Team* of their violation at the end of the *Match*. At the *Head Referee's* discretion, repeated violations and *Disqualifications* for a single *Team* may lead to its *Disqualification* for the entire event.

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Driver – The *Student* Team member who stands in the *Driver Station* and is responsible for operating and controlling that *Team's Robot*. Up to two *Team* members may fulfill this role in a given *Match* (see <G7>).

Driver Controlled – A *Robot* operating under the control of a *Driver*.

Driver Station – The regions on each end of the *Field*, where the *Drivers* must remain during their *Match* unless legally interacting with their *Robot*.

Field – The entire playing *Field*, being six (6) field tiles wide by eight (8) field tiles long totalling forty-eight (48) field tiles, surrounded by the field perimeter consisting of four (4) outside corners and twenty-four (24) straight sections.

Field Element – The field perimeter, *Floor*, and VEX IQ elements attached to the *Field*.

Floor – The interior part of the playing *Field* made up of the field tiles that is within the field perimeter.

Goal – One of the nine (9) 3-dimensional volumes extending upwards from the *Floor* that are used to Score *Risers*. The blue VEX IQ elements form a perimeter around the base of each *Goal*. The VEX IQ elements are not considered part of the *Goal*.

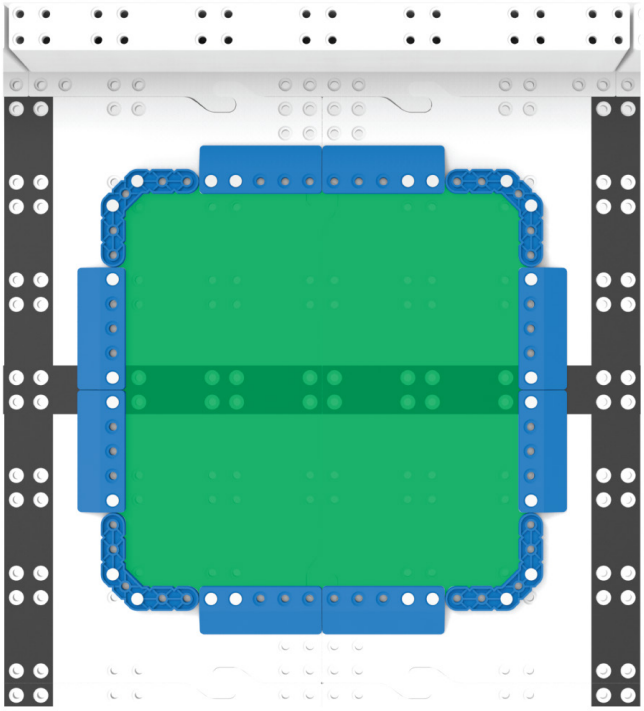


Figure 9: *A VIQC Rise Above* ***Goal***

License Plate – A physical component on the *Robot* that has the *Team's* VEX IQ Challenge number displayed. The *License Plate* must have a length and height of 3.5" x 1.5" (88.9mm x 38.1mm) and must not exceed a width of 0.25" (6.35mm) per <R4>.

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Match – A *Driving Skills Match*, *Programming Skills Match*, or *Teamwork Match*.

- **Driving Skills Match** – A *Driver Controlled* period that is sixty seconds (1:00) long with only one (1) *Robot* on the *Field*.
- **Programming Skills Match** – An *Autonomous* period that is sixty seconds (1:00) long with only one (1) *Robot* on the *Field*.
- **Skills Match** – A *Driving Skills Match* or *Programming Skills Match*.
- **Teamwork Match** – A *Driver Controlled* period that is sixty seconds (1:00) long with one (1) *Alliance* on the *Field*.

Programmer – The *Student*(s) on the *Team* who write(s) the computer code that is downloaded onto the *Robot*. An *Adult* cannot be the *Programmer* on a *Team*. *Adults* are permitted to teach the *Programmer* associated concepts, but may never be working on the code that goes on the *Robot* without the *Programmer* present and actively participating.

Riser – An orange, purple or teal right octagonal prism with a width of 7" (177.8mm) and a height 8.75" (222.25mm).

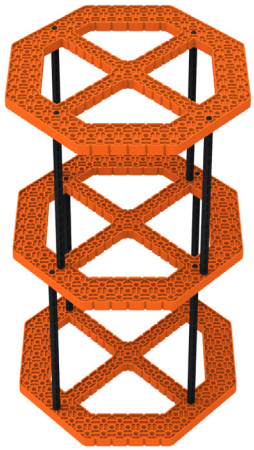


Figure 10: *A VIQC Rise Above* ***Riser***

Robot – A machine that has passed inspection, designed to execute one or more tasks autonomously and/or by remote control from a human operator.

Row - Three (3) *Goals* that make up a straight line. There are a total of eight (8) *Rows*.

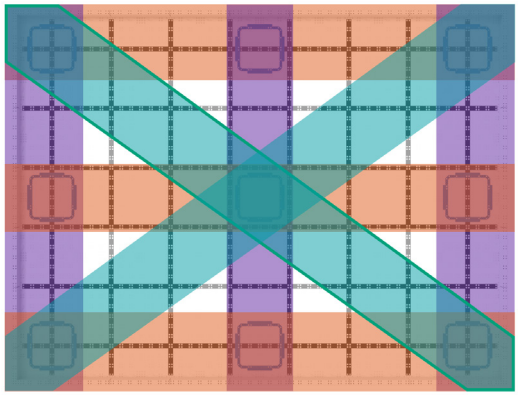


Figure 11: *The eight* ***Row*** *combinations in VIQC Rise Above.*

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Scored – A *Riser* status. A *Riser* is Scored at the end of the *Match* if it is not touching a *Robot* and meets the criteria of being either a *Base Riser* or a *Stacked Riser*.

- **Base Riser** - A *Riser* status. A *Riser* is considered a *Base Riser* if it meets the following criteria at the end of the *Match.*
  1. Contacting the *Floor* within the *Goal*.
  2. The octagonal faces are parallel with the *Floor*, i.e. the *Riser* is upright and not sitting on top of the VEX IQ elements surrounding the base of the *Goal*.
  3. Not contacting the *Floor* outside of the *Goal*.

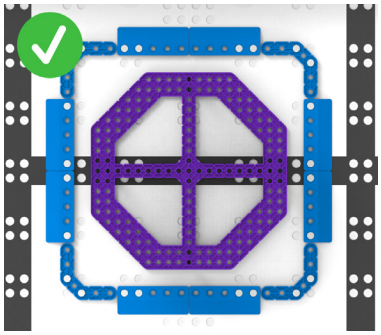


Figure 12: *A Scored* ***Base Riser****.*

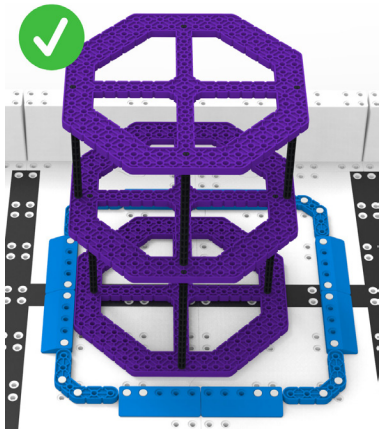


Figure 13: *Scored due to the* ***Riser*** *being fully flush with the* ***Goal*** *and not sitting on top of the elements surrounding the* ***Goal****.*

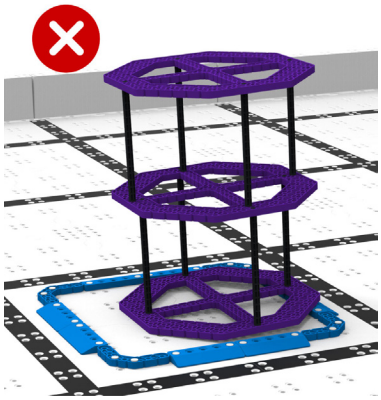


Figure 14: *This* ***Riser*** *is sitting on top of the elements that make up the* ***Goal****. It would not be considered Scored.*

- **Stacked Riser** - A *Riser* status. A *Riser* is considered a *Stacked Riser* if it meets the following criteria at the end of the *Match*.
  1. The octagonal faces are parallel with the *Floor*, i.e. the *Riser* is upright.
  2. The bottom octagonal face is contacting the top octagonal face of a *Base Riser* or a *Stacked Riser*. For the purposes of this definition, "top" refers to the octagonal face furthest from the *Floor*, and "bottom" refers to the octagonal face closest to the *Floor*.

Note: Each *Goal* may only contain up to three (3) Scored *Risers*, up to one (1) *Base Riser* and (2) *Stacked Risers*.

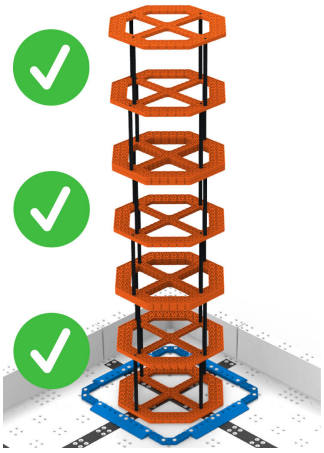


Figure 15: *These* ***Risers*** *are upright and in contact with a Scored* ***Base Riser****. All three* ***Risers*** *would be considered Scored and would be eligible for a* ***Completed Stack****.*

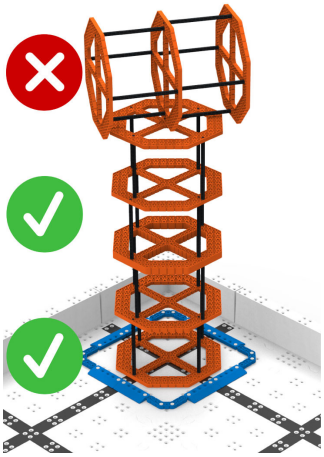


Figure 16: *The top* ***Riser*** *is not upright, and would not be considered Scored. Only the two lower* ***Risers*** *would be considered Scored. This would not be eligible for a* ***Completed Stack****.*

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Starting Positions – The two (2) designated 11" x 19" (279.4mm x 482.6mm) volumes of the *Field* where *Robots* must start the *Match*. *Starting Positions* are bounded by the inner edges of the long black lines, outer edge of the short black line, and the inner edge of the field perimeter. See Figure 2 for more details.

Student – Anyone born after May 1, 2005 (i.e. who will be 15 or younger at VEX Worlds 2021). Eligibility may also be granted based on a disability that has delayed education by at least one year. *Students* are the individuals who design, build, repair, and program the *Robot* with minimal *Adult* assistance.

- **Elementary School Student** - Any *Student* born after May 1, 2008 (i.e. who will be 12 or younger at VEX Worlds 2021). *Elementary School Students* may "play up" and compete as a *Middle School Student*.

- **Middle School Student** – Any eligible *Student* that is not an *Elementary School Student*.

Team – Two or more *Students* make up a *Team*. A *Team* is classified as an Elementary School *Team* if all members are *Elementary School Students*. A *Team* is classified as a Middle School *Team* if any members are *Middle School Students*, or made up of *Elementary School Students* who declare themselves as "Playing Up" as *Middle School Students* by registering their team as a Middle School *Team*. Once declared and playing as a Middle School *Team*, that *Team* may not change back to a Elementary School *Team* for the remainder of the season. *Teams* may be associated with schools, community/youth organizations, or a group of neighborhood *Students*.

Teamwork is a core tenet of the VEX IQ Challenge, and the recommended *Team* size is 2-3 *Students*. However, in the 2020-2021 season, there may be local health guidelines outside of *Team* control that make it difficult for multiple *Students* to meet together on a regular basis. In these circumstances, one-*Student Teams* are a permissible exception to the recommended *Team* size.

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Scoring

- A *Base Riser* is worth one (1) point.
- A *Stacked Riser* is worth one (1) point.
- A *Completed Row* is worth three (3) points.
- A *Completed Stack* is worth thirty (30) points.

Safety Rules

<S1> Stay safe, don't damage the Field. If, at any time, the *Robot* operation or *Team* actions are deemed unsafe or have damaged any *Field Elements* or *Risers*, the offending *Team* may be Disabled and/or Disqualified at the referees' discretion. The *Robot* will require re-inspection before it may again take the *Field*.

General Game Rules

<G1> Treat everyone with respect. All *Students* and *Adults* associated with a *Team* are expected to conduct themselves in a respectful and positive manner while participating in the VEX IQ Challenge. If *Team* members are disrespectful or uncivil to staff, volunteers, or fellow *Teams* at an event, the *Team* may be Disqualified from their current or upcoming *Match*. Judges may also consider team conduct and ethics when determining awards.

In all aspects of the VEX IQ Challenge program, the *Students* make the decisions and do the work with *Adult* mentorship. The VEX community prides itself on being a positive learning environment where no one is bullied, harassed, or berated. *Teams* avoid placing unnecessary stress upon *Students* and/or event volunteers; instead, challenging situations are viewed as teachable moments to model positive behaviors and good sportsmanship.

This rule exists alongside the REC Foundation Code of Conduct. Violation of the Code of Conduct can be considered a violation of <G1> and can result in *Disqualification* from a current *Match*, an upcoming *Match*, an entire event, or (in extreme cases) an entire competition season. The Code of Conduct can be found at http://link.roboticseducation.org/recf_codeofconduct

For the 2020-2021 season, some events may establish additional Health & Safety guidelines beyond the scope of this Game Manual. These guidelines will be communicated to all *Teams* in advance via Health & Safety notes associated with the event registration in RobotEvents. All *Teams* (including *Students* or any *Adults* associated with the *Team*) must abide by these guidelines as written. Violation of an event-specific Health & Safety rule may be considered a violation of <G1> and/or the REC Foundation Code of Conduct.

<G2> VEX IQ is a student-centered program. *Adults* may assist *Students* in urgent situations, but *Adults* may never work on or program a *Robot* without *Students* on that *Team* being present and actively participating. *Students* must be prepared to demonstrate an active understanding of their *Robot's* construction and programming to judges or event staff.

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Some amount of *Adult* mentorship, teaching, and/or guidance is an expected and encouraged facet of the VEX IQ Challenge. No one is born an expert in robotics! However, obstacles should always be viewed as teaching opportunities, not tasks for an *Adult* to solve without *Students* present and actively participating.

When a mechanism falls off, it is…
…okay for an *Adult* to help a *Student* investigate why it failed, so it can be improved.
…not okay for an *Adult* to put the *Robot* back together.

When a *Team* encounters a complex programming concept, it is…
…okay for an *Adult* to guide a *Student* through a flowchart to understand its logic.
…not okay for an *Adult* to write a pre-made command for that *Student* to copy/paste.

During *Match* play, it is…
…okay for an *Adult* to provide cheerful, positive encouragement as a spectator.
…not okay for an *Adult* to explicitly shout step-by-step commands from the audience.

This rule operates in tandem with the REC Foundation Student Centered Policy, which is available on the REC Foundation website for Teams to reference throughout the season:
https://www.roboticseducation.org/documents/2019/08/student-centered-policy-rec-foundation.pdf/

Violation of this rule could be considered a violation of <G1> and/or the REC Foundation Code of Conduct.

<G3> **Use common sense.** When reading and applying the various rules in this document, please remember that common sense always applies in the VEX IQ Challenge.

<G4> **Pre-match setup.** At the beginning of a *Match*, each *Robot* must meet the following criteria:

1. Only be contacting the *Floor* and/or the field perimeter.
2. Fit within an 11" x 19" (279.4mm x 482.6mm) area, bounded by the *Starting Positions*.
3. Be no taller than 15" from the *Floor*.

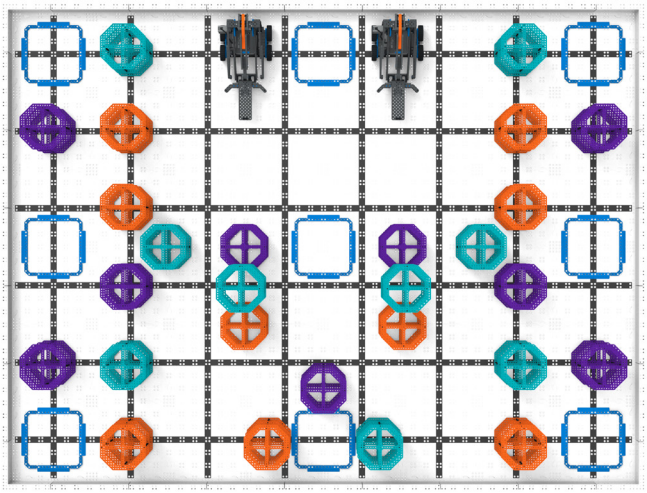


Figure 17: *Two* **Robots** *in a legal* **Match** *Starting Configuration.*

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An offending *Robot* will be removed from the *Match* at the *Head Referee's* discretion. They will not receive a *Disqualification*, but they will not be permitted to play in the *Match*.

Note 1: *Robots* must be placed on the field promptly. Repeated failure to do so could result in a violation of <G1>.

Note 2: *Robots* may expand beyond their starting size constraints after the start of the *Match*.

The exact definition of the term "promptly" is at the discretion of the *Head Referee* and the *Event Partner*, who will consider event schedule, previous warnings or delays, etc. Once the *Match* starts, expansion is unlimited.

<G5> The Robot must represent the skill level of the Team. Each *Team* must include *Drivers*, *Programmer*(s), *Designer*(s), and *Builder*(s). No *Student* may fulfill any of these roles for more than one VEX IQ Challenge *Team* in a given competition season. *Students* may have more than one role on the team, e.g. the *Designer* can also be the *Builder*, the *Programmer* and a *Driver*.

a. *Team* members may move from one *Team* to another for non-strategic reasons outside of the *Team's* control.
   i. Examples of permissible moves may include, but are not limited to, illness, changing schools, conflicts within a *Team*, or combining / splitting *Teams*.
   ii. Examples of strategic moves in violation of this rule may include, but are not limited to, one *Programmer* "switching" *Teams* in order to write the same program for multiple *Robots*, or one *Student* writing the Engineering Notebook for multiple *Teams*.
   iii. If a *Student* leaves a *Team* to join another *Team*, <G5> still applies to the *Students* remaining on the previous *Team*. For example, if a *Programmer* leaves a *Team*, then that *Team*'s *Robot* must still represent the skill level of the *Team* without that *Student*. One way to accomplish this would be to ensure that the *Programmer* teaches or trains a "replacement" *Programmer* in their absence.

b. Within a single event, a *Driver* may only drive for one (1) *Team*. If a *Team* attends an event with only one (1) *Driver* in attendance, then that *Team* is granted an allowance to use another qualified *Driver* from the Event. This substitute *Driver* is given an exemption for this event and may only Drive for this one *Team* at that event. Once the event is over, the substitute *Driver* will go back to his or her original *Team*. This exception is only granted if a *Team* has one (1) *Driver* in attendance due to reasons outside of the *Team*'s control, such as illness.

c. When a *Team* qualifies for a Championship event (e.g., States, Nationals, Worlds, etc) the *Students* on the *Team* attending the Championship event are expected to be the same *Students* on the *Team* that was awarded the spot. *Students* can be added as support to the *Team*, but may not be added as *Drivers* or *Programmers* for the *Team*.
   i. An exception is allowed if one (1) *Driver* and/or one (1) *Programmer* on the *Team* cannot attend the event. The *Team* can make a single substitution of a *Driver* or *Programmer* for the Championship event with another *Student*, even if that *Student* has competed on a different *Team*. This *Student* will now be on this new *Team* and may not substitute back to the original *Team*.

Violations of this rule will be evaluated on a case-by-case basis, in tandem with the REC Foundation Student Centered Policy as noted in <G2>, and the REC Foundation Code of Conduct as noted in <G1>.

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<G6> Be prepared to play. *Teams* must be prepared to play when they bring their *Robots* to the *Field*. For example, *Teams* must ensure that their batteries are charged and their VEX IQ Controller is paired with their *Robot* before placing the *Robot* on the *Field*.

<G7> Drivers switch Controllers midway through the Match.

a. In a given *Match*, only two (2) *Drivers* may be in the *Driver Station* per *Team*. No *Driver* shall operate a *Robot* for more than thirty-five seconds (0:35). The two *Drivers* must switch their controller between twenty-five seconds (0:25) and thirty-five seconds (0:35) remaining in the *Match*. The second *Driver* may not touch his/her *Team*'s controls until the controller is passed to him/her. Once the controller is passed, the first *Driver* may no longer touch his/her *Team*'s controls.

b. For the 2020-2021 season, *Teams* may elect to have one *Driver* in the *Driver Station*, instead of two. If only one *Driver* is present in the *Driver Station*, they may drive for the full *Match*, and a controller switch is not required. It is at the *Team's* discretion whether they wish to have one *Driver* or two. If two *Drivers* are present in the *Driver Station*, the controller switch rules in <G7a> would then apply.

c. *Drivers* are the only *Team* members that are allowed to be in the *Driver Station*. No *Adults* are permitted in the *Driver Station*.

Violations of this rule will result in a warning for minor offenses that do not affect the *Match*. Score affecting offenses will result in a *Disqualification*. *Teams* who receive multiple warnings may also receive a *Disqualification* at the *Head Referee's* discretion.

<G8> Drivers drive your Robot, and stay in the Driver Station. During a *Match*, *Robots* may only be operated by that *Team's Drivers*. *Drivers* must remain in their *Driver Station*, except when legally interacting with their *Robot* as per <G17>. *Drivers* are not allowed to use any communication devices while in the *Driver Station*. Devices with communication features turned off (e.g. a phone in airplane mode) are allowed.

<G9> Hands out of the Field. *Drivers* are prohibited from making intentional contact with any *Field Element*, *Riser*, or *Robots* during a *Match*, except for the allowances in <G17> and/or <RSC7>.

Minor violations of this rule that do not affect the *Match* will result in a warning. Score affecting offenses will result in a *Disqualification*. *Teams* that receive multiple warnings may also receive a *Disqualification* at the *Head Referee*'s discretion.

Note: Accidental contact may result in a warning, *Disqualification*, or *Disablement* at the *Head Referee's* discretion.

<G10> Keep Risers in the Field. *Risers* that leave the *Field* during a *Match* will not be returned. "Leaving the *Field*" means that a *Riser* is outside of the Field Perimeter and no longer in contact with the *Field*, *Field Elements*, other *Risers*, or *Robots*.

If a *Riser* is on its way out of the *Field* (as determined by the *Head Referee*), but is deflected back into the field by a *Driver*, field monitor, ceiling/wall, or other external factor, <G10> would apply. This *Riser* should be considered "out of the field" and removed by the *Head Referee*.

If the redirection occurred due to contact with a *Driver*, it will be at the *Head Referee's* discretion whether <G9> or <G10> should apply.

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<G11> When it's over, it's over. Scores will be calculated for all *Matches* immediately after the *Match* is complete, and once all *Robots* and *Risers* on the *Field* come to rest.

a. Referees or other event staff are not allowed to review any videos or pictures from the *Match*, per <T1b>.
b. If there is a concern regarding the score of a *Match*, only the *Drivers* from that *Match*, not an *Adult*, may share their questions with the referee.
c. This rule's intent is for *Driver* inputs and *Robot* motion to cease at the end of the *Match*. A pre-programmed routine which causes *Robot* motion to continue after the end of the *Match* would violate the spirit of this rule. Any Scoring which takes place after the *Match* due to *Robots* continuing to move will not count.

<G12> Keep your Robot together. *Robots* may not intentionally detach parts or leave mechanisms on the *Field* during any *Match*. If an intentionally detached component or mechanism affects game play, the *Team* may be Disqualified at the *Head Referee*'s discretion. Parts that become unintentionally detached from the *Robot* are no longer considered to be part of the *Robot* and can be either left on the *Field*, or collected by a *Driver* (utilizing <G17>).

<G13> Don't damage the Field or Risers. *Robots* may not grasp, grapple, or attach to any *Field Elements*. Strategies with mechanisms that react against multiple sides of a *Field Element* in an effort to latch or clamp onto said *Field Element* are prohibited.

While *Robots* are permitted to grasp, grapple, or attach to *Risers*, *Robots* which cause damage to *Risers* would be considered in violation of this rule and/or <S1>.

The intent of this rule is to prevent *Robots* from unintentionally damaging the *Field* or *Risers*. Minor violations of this rule that do not affect the *Match* will result in a warning. Score affecting offenses will result in a *Disqualification*. *Teams* that receive multiple warnings may also receive a *Disqualification* at the *Head Referee*'s discretion.

<G14> Let go of Risers after the Match is over. *Robots* must be designed to permit easy removal of *Risers* from their *Robot* without requiring that the *Robot* have power or remote control after the *Match* is over.

<G15> Be prepared for minor field variance. Field tolerances may vary by as much as ±1" unless otherwise specified. *Teams* must design *Robots* accordingly.

<G16> Match Replays are allowed, but rare. Match replays are at the discretion of the *Event Partner* and *Head Referee*, and will only be issued in the most extreme circumstances.

<G17> Handling the Robot mid-match is allowed under certain circumstances. If a *Robot* goes completely outside the playing *Field*, gets stuck, tips over, or otherwise requires assistance, the *Team's Drivers* may retrieve & reset the *Robot*. To do so, they must:

1. Signal the Referee by placing their VEX IQ Controller on the ground.
2. Move the *Robot* to any legal *Starting Position*.

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3. Any *Risers* being controlled by the *Robot* while being handled must be removed from the *Field*. Controlled requires that the *Robot* was manipulating the *Riser* and not simply touching it. In the context of this rule, "controlled" implies that the *Robot* was manipulating the *Riser* and not simply touching it. For example, if the *Riser* moves with the *Robot* either vertically or while turning, then the *Robot* is controlling the *Riser*.
4. Any *Risers* in the *Starting Positions* where the *Robot* is being placed must be removed from the Field.

If the *Drivers* cannot reach the *Robot* due to the *Robot* being in the center of the field, the *Drivers* may ask the referee to pick up the *Robot* and hand it to the *Drivers* for placement according to the conditions above.

This rule is intended so *Teams* can fix damaged *Robots* or help get their *Robots* "out of trouble." It is not intended for *Teams* to use as part of a strategy to gain an advantage during a *Match*. If a *Head Referee* sees *Teams* strategically exploiting this rule, they may be Disqualified from said *Match*.

<G18> **This manual will have four scheduled updates.** All rules in this manual are subject to change on the following dates: May 25, 2020, August 17, 2020, December 1, 2020, and March 26, 2021 . Each version is official and must be used in official VIQC events until the release of the newest version making the previous version void. Areas of focus for each update are as follows:

a. The May update will include rule changes from input from the community that post questions and responses on the official Q&A.
b. The August update will include rule changes to improve game play from early season events along with input from the community that post questions and responses on the official Q&A.
c. The December update will include clarifications that were posted on the official Q&A.
d. The March update will be specific to the VEX World Championship.

<G19> **The Q&A system is an extension of this Game Manual.** All *Teams* must adhere to all VEX IQ Challenge Rules as they are written and must abide by the stated intent of the rules. Every *Team* has the opportunity to ask for official rules interpretations in the VEX IQ Challenge Question & Answer System.

All responses in this Q&A system should be treated as official rulings from the VEX IQ Challenge Game Design Committee, and they represent the correct and official interpretation of the VEX IQ Challenge Rules. The Q&A system is the only source for official rulings and clarifications.

The VEX IQ Challenge Question & Answer System can be found at
https://www.robotevents.com/VIQC/2020-2021/QA

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Section 2
The Robot

Description

Every *Robot* must pass a full inspection before being cleared to participate in the Challenge. This inspection will ensure that all *Robot* rules and regulations are met. Initial inspections will typically take place during *Team* registration/practice time. Every *Team* should use the rules below as a guide to pre-inspect their *Robot* and ensure that it meets all requirements.

Inspection Rules

<R1> One Robot per Team. Only one (1) *Robot* will be allowed to participate per *Team* at a given event. Though it is expected that *Teams* will make changes to their *Robots* at the event, a *Team* is limited to only one (1) *Robot*, and a given *Robot* may only be used by (1) *Team*. The VEX IQ system is intended to be a mobile robotics design platform. As such, a VEX IQ Challenge *Robot*, for the purposes of the VEX IQ Challenge, has the following subsystems:

- **Subsystem 1**: Mobile robotic base including wheels, tracks, or any other mechanism that allows the *Robot* to navigate the majority of the flat playing *Field* surface. For a stationary *Robot*, the robotic base without wheels would be considered Subsystem 1.

- **Subsystem 2**: Power and control system that includes a VEX IQ legal battery, a VEX IQ control system, and associated Smart Motors for the mobile robotic base.

- **Subsystem 3**: Additional mechanisms (and associated Smart Motors) that allow manipulation of Risers or navigation of *Field* obstacles.

Given the above definitions, a minimum *Robot* for use in any VEX IQ Challenge event (including Skills Challenges) must consist of subsystem 1 and 2 above. Thus, if you are swapping out an entire sub-system of either item 1 or 2, you have now created a second *Robot* and are no longer legal.

a. *Teams* may not participate with one *Robot* while a second is being modified or assembled.
b. *Teams* may not switch between multiple *Robots*. This includes using different robots for Skills Challenge and Qualification / Elimination Matches.
c. Multiple *Teams* may not use the same *Robot* during a competition or season. Once a *Robot* has competed under a given *Team* number at an event, it is "their" *Robot* - no other *Team* may compete with it for the duration of the competition season.
d. *Robots* which have not passed inspection (i.e. who are in violation of one or more *Robots* rules) will not be permitted to play in any *Matches* until they have done so. <T10> will apply to any *Matches* that occur until the *Robot* has passed inspection.
e. If a *Robot* has passed inspection, but is later found to be in violation of a *Robot* rule during a *Match*, then they will be Disqualified from that *Match* and <R1d> will apply until the violation is remedied and the *Team* is re-inspected

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The intent of <R1a>, <R1b>, and <R1c> are to ensure an unambiguous level playing field for all *Teams*. *Teams* are welcome (and encouraged) to improve or modify their *Robots* between events, or to collaborate with other *Teams* to develop the best possible game solution.

However, a *Team* who brings and/or competes with two separate *Robots* at the same tournament has diminished the efforts of a *Team* who spent extra design time making sure that their one *Robot* can accomplish all of the game's tasks. A multi-team organization that shares a single *Robot* has diminished the efforts of a multi-team organization who puts in the time, effort, and resources to undergo separate individual design processes and develop their own *Robots*.

To help determine if a robot is a "separate *Robot*" or not, use the Subsystem definitions found in <R1>. Above that, use common sense as referenced in <G3>. If you can place two complete and legal *Robots* on a table next to each other, then they are two separate *Robots*. Trying to decide if changing a pin, a wheel, or a motor constitutes a separate robot is missing the intent and spirit of this rule.

<R2>Robots must be a representation of the skill level of the team. The *Robot* must be designed, built and programmed by members of the *Team*. *Adults* are permitted to mentor and teach design, building and programming skills to the *Students* on the *Team*, but may not design, build or program that team's *Robot*.

In VIQC, we expect *Adults* to teach different linkages, drive-trains, and manipulator applications to the *Students*, then allow the *Students* to determine which designs to implement and build on their *Robot*. *Adults* are encouraged to teach the *Students* how to code various functions involving applicable sensors, then have the *Students* program the *Robot* from what they have learned.

<R3> Robots must pass inspection. The *Team*'s *Robot* must pass inspection before being allowed to participate in any *Matches*. Noncompliance with any *Robot* design or construction rule will result in *Disqualification* of the *Robot* at an event until the *Robot* is brought back into compliance.

a. If significant changes are made to a *Robot*, it must be re-inspected before it will be allowed to participate in a *Match*. This can be done by the *Head Referee* before the start of the *Match*.
b. If a *Robot* has multiple functional configurations, all possible configurations must be inspected before being used in competition.
c. *Teams* may be requested to submit to random inspections by event personnel during the event. Refusal to submit will result in *Disqualification*.
d. Referees or inspectors may decide that a *Robot* is in violation of the *Robot* rules. In this case, the *Team* in violation will be Disqualified and the *Robot* will be barred from the *Field* until it passes re-inspection.

<R4> Only registered Teams may compete in the VEX IQ Challenge. To participate in an official VEX IQ Challenge Event, a *Team* must first register on robotevents.com. Upon registering they will receive their VEX IQ Challenge Team Number and two (2) VEX IQ Challenge *License Plates*. Every *Robot* must have at least one (1) VEX IQ Challenge *License Plate* displayed with their VEX IQ Challenge Team Number clearly written or printed upon it.

a. *License Plates* must fulfill all *Robot* rules.
b. *License Plates* must be clearly visible at all times. For example, *License Plates* must not be in a position that would be easily obstructed by a *Robot* mechanism during standard *Match* play.

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c. License Plates other than the official VEX IQ Challenge *License Plate* (VEX Part Number 228-3193) may be used.
   i. Any unofficial *License Plates* used must be the same length and height as the official *License Plate* (3.5" x 1.5" [88.9mm x 38.1mm]) . They must not exceed the width of the official *License Plate* (0.25" [6.35mm]).
   ii. Templates for a temporary *License Plate* can be found on https://www.roboticseducation.org/downloads/
   iii. Unofficial *License Plates* are considered non-functional decorations, and must therefore meet all of the criteria listed in <R8>. 3D printed *License Plates* are permitted within these rules.



Figure 18: *A VEX IQ Challenge* ***License Plate*** *with a VEX IQ Challenge Team Number written upon it.*

<R5> Starting configuration. At the start of each *Match*, the *Robot* must be able to satisfy the following constraints:

a. Only be contacting the *Floor* and/or the Field Perimeter.
b. Fit within an 11" x 19" (279.4mm x 482.6mm) area, bounded by the *Starting Positions*.
c. Be no taller than 15" from the *Floor*.

<R6> The starting configuration will be inspected. The starting configuration of the *Robot* at the beginning of a *Match* must be the same as a *Robot* configuration inspected for compliance, and within the maximum allowed size.

a. *Teams* using more than one *Robot* configuration at the beginning of *Matches* must tell the Inspector(s) and have the *Robot* inspected in its largest configuration(s).
b. A *Team* may NOT have its *Robot* inspected in one configuration and then place it in an uninspected configuration at the start of a *Match*.

<R7> VEX IQ product line. *Robots* may be built ONLY from Official Robot Components from the VEX IQ product line, unless otherwise specifically noted within these rules.

a. Official VEX IQ products are ONLY available from VEX Robotics & official VEX Resellers. To determine whether a product is "official" or not, consult www.vexiq.com.
b. If an Inspector or event official questions whether something is an official VEX IQ component, the *Team* will be required to provide documentation to an Inspector that proves the component's source. Such types of documentation include receipts, part numbers, or other printed documentation.

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c. Only the VEX IQ components specifically designed for use in *Robot* construction are allowed. Using additional components outside their typical purpose is against the intent of the rule (i.e. please don't try using VEX IQ apparel, team or event support materials, packaging, *Field Elements*, or other non-robot products on a VEX IQ Challenge *Robot*).
d. Products from the VEX V5, Cortex, or VEXpro product line cannot be used for *Robot* construction. Products from the VEX product line that are also cross-listed as part of the VEX IQ product line are legal. A "cross-listed" product is one which can be found in both the VEX IQ and VEX V5 sections of the VEX Robotics website.
e. Mechanical/structural components from the VEX Robotics by HEXBUG product line are legal for *Robot* construction. However, electrical components from the VEX Robotics by HEXBUG product line are illegal for *Robot* construction.
f. Mechanical/structural components from the VEX GO product line are legal for *Robot* construction. However, electrical components from the VEX GO product line are illegal for *Robot* construction.
g. Official Robotics Components from the VEX IQ product line that have been discontinued are still legal for *Robot* use. However, Teams must be aware of <R7b>.
h. 3D printed components, such as replicas of legal VEX IQ parts or custom designs, are not legal for *Robot* use.
i. Additional VEX IQ products that are released during the season are legal for use.

Note: A comprehensive list of legal parts can be found in the VEX IQ Challenge Legal Parts Appendix, at https://www.vexrobotics.com/iq/competition/viqc-current-game . This Appendix is updated as needed if/when new VEX IQ parts are released, and may not coincide with the scheduled Game Manual updates in <G18>.

<R8> Non-VEX IQ components. *Robots* are allowed to use the following additional "non-VEX IQ" components:

a. Appropriate non-functional decorations, provided that these do not affect the *Robot* performance in any significant way or affect the outcome of the *Match*. These decorations must be in the spirit of the event. Inspectors will have the final say in what is considered "nonfunctional".
   i. Any decorations must be backed by legal materials that provide the same functionality, (i.e. if your *Robot* has a giant decal that prevents *Risers* from falling out of the *Robot*, the decal must be backed by VEX IQ material that also prevents the *Risers* from falling out).
   ii. The use of non-toxic paint is considered a legal non-functional decoration. However, any paint being used as an adhesive or to impact how tightly parts fit together would be classified as functional.
b. Rubber bands that are identical in length and thickness to those included in the VEX IQ product line (#32 & #64).
c. ⅛" metal shafts from the VEX V5 product line.

<R9> Microcontroller. *Robots* are limited to ONE (1) VEX IQ Robot Brain.

a. Robot Brains, microcontrollers, or other electronic components that are part of the VEX Robotics by HEXBUG, VEX GO, VEX V5, VEX 123, or VEXpro product lines are not allowed
   i. The Robot AA Battery Holder (228-3493) is the only exception to this rule, per <R12>
b. *Robots* must use one (1) VEX IQ 900 MHz radio, VEX IQ 2.4 GHz radio, or VEX IQ Smart Radio in conjunction with their VEX IQ Robot Brain.

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c. The only legal method of driving the *Robot* during *Teamwork Matches* and *Driving Skills Matches* is the VEX IQ Controller.

<R10> Motors. *Robots* may use up to six (6) VEX IQ Smart Motors.

a. Additional motors cannot be used on the *Robot* (even ones that aren't connected).

<R11> Batteries. The only allowable sources of electrical power for a VEX IQ Challenge *Robot* is one (1) VEX IQ Robot Battery or six (6) AA batteries via the Robot AA Battery Holder (228-3493).

a. Additional batteries cannot be used on the *Robot* (even ones that aren't connected).
b. *Teams* are permitted to have an external power source (such as a rechargeable battery pack) plugged into their VEX IQ Controller during a *Match*, provided that this power source is connected safely and does not violate any other rules (such as <G6>).

Note: Although it is legal, the Robot AA Battery Holder (228-3493) is not recommended for use in the VEX IQ Challenge.

<R12> Firmware. *Teams* must have their VEX IQ firmware (VEXos) up to date. *Teams* can download the latest version of VEXos at www.vexiq.com/vexos .

<R13> Modifications of parts. Parts may NOT be modified. Examples of modifications include, but are not limited to, bending, cutting, sanding, gluing, or melting.

a. Cutting metal VEX IQ or VEX V5 shafts to custom lengths is permitted. This is the only legal exception to this rule.

Teams should remember to prioritize student safety at all times if attempting to cut metal shafts. *Adult* assistance in the spirit of <G2> is a must-have, and sharp edges must be sanded or otherwise rounded off.

Similarly, any use of power tools in a pit space while at an event must be discussed with the *Event Partner* in advance. Even if used in a safe capacity, there is still a possibility of violating venue / event rules, or causing alarm for nearby teams. If used without significant regard for safety, it could be considered a violation of the REC Foundation Code of Conduct.

<R14> Prohibited items. The following types of mechanisms and components are NOT allowed:

a. Those that could potentially damage *Field Elements* or *Risers*.
b. Those that could potentially damage other *Robots*.
c. Those that pose an unnecessary risk of entanglement.

<R15> Passing Inspection. A *Robot* is deemed successfully inspected when it has been recorded as "passed" by an Inspector.

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Section 3
The Tournament

Description

The VEX IQ Challenge encompasses both the *Teamwork Challenge* and the *Robot Skills Challenge*. This section determines how the *Teamwork Challenge* and *Robot Skills Challenge* are to be played at a given event.

Awards may be given to top *Teams* in each format, as applicable. Awards may also be given for overall performance in the judged criteria. Please review the Awards Appendix for more details, available in the VEX IQ Challenge (2020-21 Rise Above) section of www.vexrobotics.com or www.roboticseducation.org.

Tournament Definitions

Event Partner - The VEX IQ Challenge tournament coordinator who serves as an overall manager for the volunteers, venue, event materials, and all other event considerations. *Event Partners* serve as the official liaison between the REC Foundation, the event volunteers, and event attendees.

Finals Match – A *Teamwork Match* used to determine the *Teamwork Challenge* champions.

Head Referee - An impartial volunteer responsible for enforcing the rules in this manual as written. *Head Referees* are the only people who may discuss ruling interpretations or scoring questions with *Teams* at an event.

Match Stop Time – The time remaining (i.e. displayed on the timer or audience display) in a tiebreaker *Finals Match* when an *Alliance* ends the *Match* early by placing their controllers on the ground. The *Match Stop Time* is rounded down to the nearest even number. For example, if controllers are set down when the displayed time is 13 seconds, the *Match Stop Time* is recorded as 12 seconds. If an *Alliance* does not finish the *Match* early, they receive a default *Match Stop Time* of 0 seconds.

Practice Match – A non-scored *Match* used to provide time for *Teams* to get acquainted with the official playing *Field*.

Qualifying Match – A *Teamwork Match* used to determine the event rankings.

Robot Skills Challenge – A portion of the VEX IQ Challenge. The *Robot Skills Challenge* consists of *Driving Skills Matches* and *Programming Skills Matches*.

Teamwork Challenge – A portion of the VEX IQ Challenge. The *Teamwork Challenge* consists of *Teamwork Matches*. The *Teamwork Challenge* includes *Qualifying Matches* and *Finals Matches*, and may include *Practice Matches*.

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Tournament Rules

<T1>The Head Referee has ultimate authority on ruling decisions during the competition.

a. *Head Referees* must have the following qualifications.
   i. Be at least 16 years of age
   ii. Be approved by the Event Partner
   iii. Contain the following attributes:
      1. Thorough knowledge of the current game and rules of play
      2. Effective decision making
      3. Attention to detail
      4. Ability to work effectively as a member of a team
      5. Ability to be confident and assertive when necessary
      6. Strong communication and diplomacy skills
   iv. The *Head Referee* must be an REC Foundation Certified VIQC *Head Referee* for the current season.
b. *Head Referees* may not review any photo or video Match recordings to determine a score or ruling.
c. *Head Referees* are the only people permitted to explain a rule, *Disqualification* or warning to the *Teams*.
d. The *Head Referee* must give the rule number of the rule violated when issuing a *Disqualification* or warning to a *Team*.

Violations of the REC Foundation Code of Conduct may involve additional escalation beyond the Head Referee's initial ruling, including (but not limited to) investigation by an REC Foundation representative. Rules <S1>, <G1>, and <G2> are the only rules for which this escalation may be required.

Note: Scorekeeper Referees score the *Match*, serve as observers for the *Head Referees* and advise the *Head Referee*, but should not communicate any rules or infractions directly to the *Teams*. Scorekeeper Referees must be at least 15 years of age.

<T2> The Drivers are permitted to immediately appeal the Head Referee's ruling. If the *Drivers* wish to dispute a score or ruling, those *Drivers* must stay in the *Driver Station* until the *Head Referee* talks with them. The *Head Referee* may choose to meet with the *Drivers* at another location and/or at a later time so that the *Head Referee* has time to reference materials or resources to help with the decision. Once the *Head Referee* announces that his or her decision has been made final, the issue is over and no more appeals may be made. The *Event Partner* may not overrule the *Head Referee*'s decision.

Violations of this rule may result in the team being Disqualified from the *Match* in question and/or the event and is up to the discretion of the *Head Referee*.

<T3> Teamwork Matches. During *Teamwork Matches*, two (2) *Teams* form an *Alliance* that will play on the *Field*.

a. *Qualifying Match Alliances* are randomly selected.
b. *Finals Match Alliances* are assigned as follows:
   i. The first and second ranked *Teams* form an *Alliance*
   ii. The third and fourth ranked *Teams* form an *Alliance*
   iii. And so on, until all *Teams* participating in *Finals Matches* have formed an *Alliance*.

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<T4> Timeouts. There are no timeouts in *Qualifying Matches* or *Finals Matches*.

<T5> Ending a Match early. If an *Alliance* wants to end a *Qualifying Match* or a *Finals Match* early, both *Teams* must signal the referee by ceasing all *Robot* motion and placing their controllers on the ground. The referee will then signal to the *Teams* that the *Match* is over and will begin to tally the score. If the *Match* is a tiebreaker *Finals Match*, then the *Match Stop Time* will also be recorded.

<T6> Practice Matches may be played at some events, but are not required. If *Practice Matches* are run, every effort will be made to equalize practice time for all *Teams*.

<T7> Qualifying Matches will occur according to the official match schedule. This schedule will indicate *Alliance* partners, *Qualifying Match* time, and, if the event has multiple *Fields*, which *Field* the *Qualifying Match* will be played on.

Note: The official *Match* schedule is subject to changes at the *Event Partner*'s discretion.

<T8> Each Team will be scheduled Qualification Matches as follows.

a. When in a tournament, the tournament must have a minimum of four (4) *Qualifying Matches* per *Team*. The suggested amount of *Qualifying Matches* per *Team* for a standard tournament is six (6) and up to ten (10) for a championship event.
b. When in a league, there must be at least three (3) league ranking sessions and each session must have a minimum of two (2) *Qualifying Matches* per *Team*. The suggested amount of *Qualifying Matches* per *Team* for a standard league ranking session is four (4). *Event Partners* may choose to have *Qualifying Matches* as part of their league finals session.

<T9> Teams are ranked by their average Qualifying Match scores.

a. When in a tournament, every *Team* will be ranked based on the same number of *Qualifying Matches*.
    i. For tournaments that have more than 1 division, *Teams* will be ranked among all *Teams* in the event, i.e. there is no divisional ranking. The top *Teams*, regardless of division, will advance to the *Finals Matches*.
b. When in a league, every *Team* will be ranked based on the number of *Matches* played. *Teams* that participate in less than 60% of the total *Matches* available will be ranked below *Teams* that participate in at least 60% of the total *Matches* available, e.g. if the league offers 3 ranking sessions with 4 *Qualifying Matches* per *Team*, *Teams* that participate in 8 or more *Matches* will be ranked higher than *Teams* who participate in 7 or fewer *Matches*. Being a no-show to a *Match* that a *Team* is scheduled in still constitutes participation for these calculations.
c. A certain number of a *Team*'s lowest *Qualifying Match* scores will be excluded from the rankings based on the quantity of *Qualifying Matches* each *Team* plays. Excluded scores do not affect participation for leagues.

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Number of Qualifying Matches per Team	Number of excluded Match scores
Between four (4) and seven (7)	1
Between eight (8) and eleven (11)	2
Between twelve (12) and fifteen (15)	3
Sixteen (16) or more	4

Table 1: *Matches that will be "dropped" from a Team's final average* ***Qualifying Match*** *scores.*

d. In some cases, a *Team* will be asked to play an additional *Qualifying Match*. The extra *Match* will be identified on the *Match* Schedule with an asterisk and will not impact the *Team*'s ranking (or participation for leagues). *Teams* are reminded that <G1> is always in effect and *Teams* are expected to behave as if the additional *Qualifying Match* counted.
e. Ties in *Team* ranking are broken by:
   i. Removing the *Team*'s lowest score and comparing the new average score.
   ii. Removing the *Team*'s next lowest score and comparing the new average score (on through all scores).
   iii. If the *Teams* are still tied, the *Teams* will be sorted by random electronic draw.

<T10> Be at your match on time. If no member of a *Team* is present in the *Driver Station* at the start of a *Driver Station*, that *Team* is considered a "no show" and will receive zero (0) points. The other *Team* in the *Alliance* will still play and receive points for the *Match*.

<T11> Disqualifications. A *Team* that is Disqualified in a *Qualifying Match* receives zero (0) points for the *Match*. The other *Team* on their *Alliance* will still receive points for the *Match*.

a. In *Finals Matches*, *Disqualifications* apply to the whole *Alliance*, not just one *Team*. An *Alliance* that is Disqualified in a *Finals Match* will receive zero (0) points.

<T12> Teams playing in Finals Matches. The number of *Finals Matches*, and therefore the number of *Teams* who will participate in *Finals Matches*, is determined by the *Event Partner*. Events that qualify teams directly to VEX Worlds must have a minimum of five (5) *Finals Matches* if there are ten (10) or more *Teams* in attendance.

<T13> Finals Match Schedule. *Finals Matches* are played sequentially, starting with the lowest ranked *Alliance*. Each *Alliance* will participate in one (1) *Finals Match*. The *Alliance* with the highest *Finals Match* score is the *Teamwork Challenge* champion.

a. *Alliances* are ranked by their *Finals Match* score. The highest scoring *Alliance* is in first place, the second highest scoring *Alliance* is in second place, etc.
b. Ties for first place will result in a series of tiebreaker *Finals Matches*, starting with the lower seeded *Alliance*. The *Alliance* with the highest tiebreaker *Finals Match* score will be declared the *Teamwork Challenge* champion.
   i. If the tiebreaker *Finals Match* scores are tied, the *Alliance* with the higher *Match Stop Time* will be declared the winner.
   ii. If the *Match Stop Time* is also tied, a second series of tiebreaker *Finals Matches* will be played. If this second series of tiebreaker *Finals Match* is also tied, then the higher seeded *Alliance* will be declared the winner.
c. If there is a tie for a place other than first, the higher seeded *Alliance* will receive the higher rank.

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Example 1: *Alliance* 6 and *Alliance* 3 are tied for first place. During the tiebreaker *Finals Match*, *Alliance* 6 scores 13 points and has a *Match Stop Time* of 12 seconds. *Alliance* 3 scores 13 points and has a *Match Stop Time* of 10 seconds. Alliance 6 is the *Teamwork Challenge* winner.

Example 2: *Alliance* 4 and *Alliance* 5 are tied for third place. *Alliance* 4 is the third place winner and *Alliance* 5 is the fourth place winner.

In this way, the lower ranked *Alliance* must "overcome" the higher ranked *Alliance* in order to become the *Teamwork Challenge* champion.

<T14> Elevated Fields. At many events, the playing *Field* will be placed on the ground. Some events may choose to elevate their *Fields*. At the 2021 VEX Robotics World Championship, the *Fields* will be 18" high.

<T15> Students must be accompanied by an Adult. No *Student* may attend a VIQC event without a responsible *Adult* supervising them. The *Adult* must obey all rules and be careful to not violate student-centered policies, but must be present at the event in the case of an emergency.

Robot Skills Challenge Rules

<RSC1> Standard rules apply in most cases. All rules and scoring from previous sections apply to the *Skills Matches*, unless otherwise specified.

<RSC2> Skills Field Layout. For each *Skills Match*, the *Field* will be setup as shown in the diagram below. All of the *Goals* are in the same locations and only the *Risers* have been rearranged on the *Field*.

Note: Some *Risers* (highlighted below) will start *Skills Matches* while resting on top of the VEX IQ pieces that make up a *Goal*. This applies to (5) Orange *Risers*, (3) Teal *Risers*, and (3) Purple *Risers*).

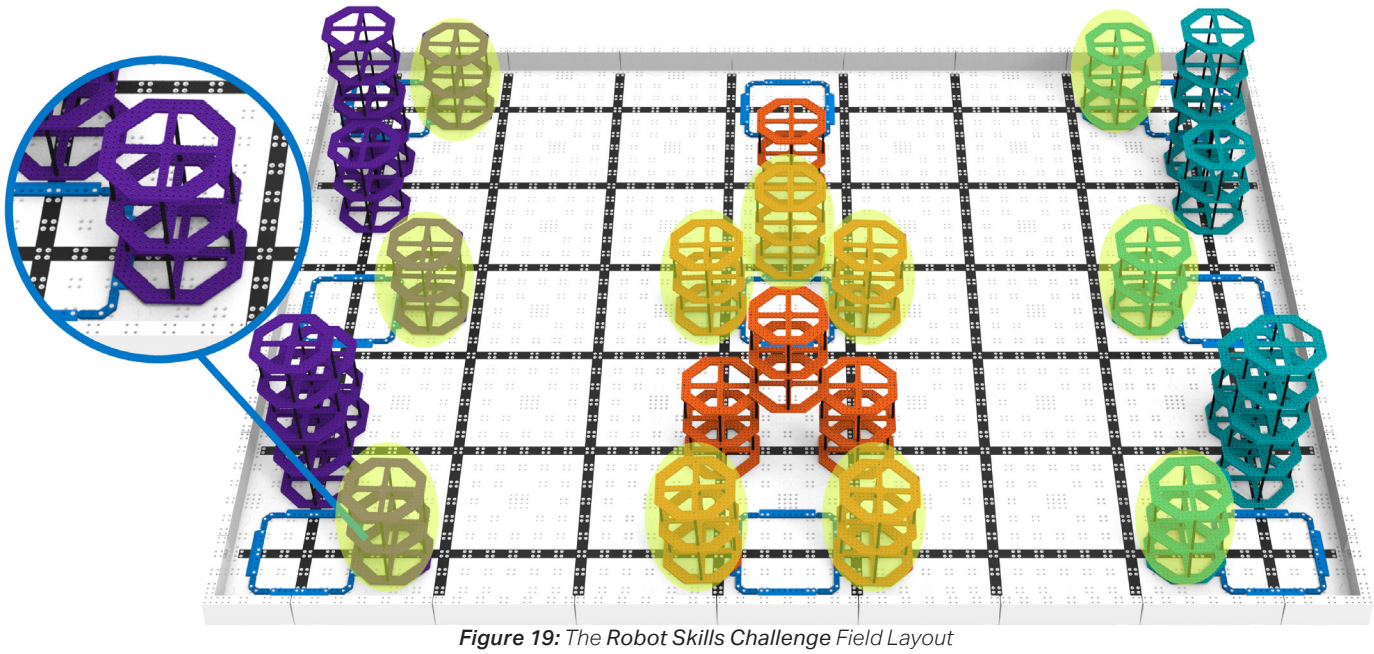


Figure 19: *The Robot Skills Challenge Field Layout*

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<RSC3> Skills Scoring and Ranking at events. For each *Skills Match*, *Teams* are awarded a score based on the standard rules and scoring rules. *Team* will be ranked based on the sum of their highest *Programming Skills Match* score and highest *Driving Skills Match* score.

a. If two *Teams* are tied for the highest score, the tie will be broken by looking at both *Team's'* next highest *Programming Skills Match* score. If the *Teams* remain tied, the tie will be broken by looking at both *Team's'* next highest *Driving Skills Match* score. This process will repeat until the tie is broken. If a *Team* only plays one or two (1 or 2) of their available Programming or Driving Skills Matches, their score for the unattempted *Match*(es) will be considered a score of zero (0) when determining the winner of ties.
b. If the tie cannot be broken (i.e. both *Teams* have the exact same scores for each *Programming Skills Match* and *Driving Skills Match*), then the following ordered criteria will be used to determine which team had the "best" *Programming Skills Match*:
    i. Points for *Completed Stacks* in highest *Programming Skills Match*
    ii. Points for *Completed Rows* in highest *Programming Skills Match*
    iii. Points for *Completed Stacks* in highest *Driving Skills Match*
    iv. Points for *Completed Rows* in highest *Driving Skills Match*
c. If the tie still cannot be broken, the same process in the step above will be applied to the *Team's* highest *Driving Skills Match*.
d. If the tie still isn't broken, the *Event Partner* may choose to allow *Teams* to have one more deciding *Match*, or both *Teams* may be declared the winner.

<RSC4> Skills Rankings Globally. *Teams* are ranked based on their *Robot Skills* scores globally based on the following tiebreakers.

a. Highest *Robot Skills* score (combined Programming and Driving Skills Score from a single event)
b. Highest Programming Skills score
c. Highest Driving Skills score
d. Earliest posting of the Highest Programming Skills score, i.e. the first team to post a score ranks ahead of other teams that post the same score at a later time.
e. Earliest posting of the Highest Driving Skills score, i.e. the first team to post a score ranks ahead of other teams that post the same score at a later time.

<RSC5> Skills Starting Positions. During *Skills Matches*, *Robots* may be placed in either of the two (2) *Starting Positions* on the *Field*.

<RSC6> Skills Match Schedule. *Teams* play *Skills Matches* on a first-come, first-served basis. Each *Team* will get the opportunity to play exactly three (3) *Driving Skills Matches* and three (3) *Programming Skills Matches*.

Teams should review the event agenda and their *Match* schedule to determine when the best possible time is to complete their *Robot Skills Matches*. If the Robot Skills area closes before a *Team* has completed all six (6) R*obot Skills Matches*, but it is determined that there was adequate time given, then the *Team* will automatically forfeit those unused Matches.

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<RSC7> Handling Robots during a Programming Skills Match. A *Team* may handle their *Robot* as many times as desired during a *Programming Skills Match*.

a. Upon handling the *Robot*, it must be immediately brought back to any legal *Starting Position*.
   i. *Drivers* may reset or adjust the *Robot* as desired from this position, including pressing buttons on the Robot Brain or activating sensors.
b. Any *Riser* being controlled by the *Robot* while being handled must be removed from the *Field*. Controlled requires that the *Robot* was manipulating the *Riser* and not simply touching it, e.g. if the *Riser* moves with the *Robot* either vertically or while turning, the *Robot* is controlling the *Riser*.
c. Any *Riser* contacting the chosen *Starting Position* (as to where the *Robot* is placed) must be removed from the *Field* for the remainder of the *Match*.
d. During a *Programming Skills Match*, *Drivers* may move freely around the *Field*, and are not restricted to the *Driver Station* when not handling their *Robot*.
   i. The rest of <G8>, which states that *Drivers* are not allowed to use any communication devices during their *Match*, still applies.
   ii. An intent of this exception is to permit *Drivers* who wish to "stage" *Robot* handling during a *Programming Skills Match* to do so without excessive running back and forth to the *Driver Station*.

Note: This rule only applies to *Programming Skills Match*. *Driving Skills Matches* are still governed by <G17>, especially for strategic violations.

<RSC8> Starting a Programming Skills Match. *Drivers* must start a Robot's *Programming Skills Match* routine by pressing a button on the Robot Brain or manually activating a sensor. Because there is no VEX IQ Controller hand-off, only one (1) *Driver* is required for *Programming Skills Match* (though *Teams* may still have two (2) if desired). <G7> still applies to any *Driver* participating in the *Match*.

a. Pre-match sensor calibration is considered part of the standard pre-match setup time, i.e. the time when *Team* would typically be turning on the *Robot*, moving any mechanisms to their desired legal start position, etc.
b. Pressing a button on the VEX IQ Controller to begin the routine is not permitted.

In accordance with <G6>, *Teams* should be mindful of event schedules and set their *Robot* up as promptly as possible. The definition of "prompt" is at the discretion of the *Event Partner* and *Head Referee*, and could depend on things like how much time is left for the Skills Challenge field(s) to be open, how many *Teams* are waiting in line, etc. As a general guideline, three seconds to calibrate a Gyro Sensor would be acceptable, but three minutes to debug a program would not.

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Robot Skills Challenge Format Options

To better accommodate varying health & safety circumstances in different regions, the 2020-2021 season will feature several different avenues for *Event Partners* to host Robot Skills Challenge competitions. Regardless of the format chosen for a given event, all rules, scoring, and rankings listed in this Appendix apply. However, some formats will have additional rules in place to ensure fair and consistent gameplay.

Robot Skills Challenge at a Standard Qualifying Tournament

- The Robot Skills Challenge is an optional event. *Teams* who do not compete will not be penalized in the main tournament.
- *Teams* may play Robot Skills Matches on a "first come, first serve" basis, or by a pre-scheduled method determined by the *Event Partner*.
- *Teams* will be given the opportunity to play exactly three (3) *Programming Skills Matches* and three (3) *Driving Skills Matches*. *Teams* should be aware of when the Robot Skills fields are open so that they do not miss their opportunity, e.g. if a *Team* waits until five minutes before the Robot Skills fields close, then they have not used the opportunity given to them and will not be able to compete in all six matches.

Skills-Only Event: In-Person, Live

- *Teams* may play Robot Skills Matches on a "first come, first serve" basis, or by a pre-scheduled method determined by the *Event Partner*.
- Further details regarding Skills-Only Event logistics can be found in the REC Foundation Qualification Criteria document.

Skills-Only Event: Remote, Live

A "Remote, Live" Skills-Only Event is an event held exclusively via a live online video platform organized by the *Event Partner*. The intent of a Remote, Live event is to replicate the competition experience of an "In-Person, Live" Skills-Only Event as much as possible.

Additional rules and requirements have been established in an effort to help facilitate a fair and flexible experience for all *Teams* and *Event Partners*.

<RSE1> The Remote Skills Only environment (i.e. digital platform) may be chosen at the *Event Partner's* discretion.

a. All registered *Teams* must be able to view live the matches being played by all other registered *Teams*.
b. REC Foundation Staff must have access to view all matches while being played live.
c. The online meeting environment must not be accessed or viewed by the general online public while the event is live, e.g. the event must be password protected or invite-only.
    i. Guests invited by the *Event Partner* can be able to view, but may not have use of their microphone or camera or display anything for teams to see or hear.

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ii. One example that would satisfy this requirement would be to use an online video conferencing application that allows for a large number of people who must register to attend. The *Event Partner* would approve spectators who can view the matches, but would only give *Teams* the ability to share their screen, camera or microphone.
iii. After the event is over, there are no such restrictions (i.e. the *Event Partner* may post a recording of the event if they wish).

<RSE2> Registered *Teams* will be assigned scheduled times to complete *Robot* Inspection and up to (3) *Programming Skills Matches* and (3) *Driving Skills Matches* over a live, online environment.

<RSE3> The minimum event staff must include one (1) *Event Partner* and at least one (1) certified *Head Referee*. A dedicated Tournament Manager operator is also recommended, but not required, if the *Head Referee* and/or *Event Partner* wish to fulfill this role.

<RSE4> At all times, there must be a minimum of (2) *Adults* over the age of 18 in the remote meeting environment before *Students* are allowed to connect. One of those *Adults* must be the *Event Partner*.

<RSE5> The *Team's* Primary Contact, or another designated *Adult Team* contact (over the age of 18), must be present in the remote meeting environment throughout the duration of the scheduled time for that *Team*. The *Team's* Primary Contact will be responsible for providing the *Adult* representative's contact information to the *Event Partner* prior to the event.

<RSE6> *Teams* will complete a full *Robot* inspection, in accordance with <R3>, live with the *Head Referee* prior to their first Robot Skills Match. This inspection process should follow the checklist on a standard inspection sheet, including a demonstration of sizing compliance as explained in <R5>.
Note: This inspection may also include an informal "*Field* inspection", to ensure that a *Team's* remote environment is set up properly for their *Matches*.

<RSE7> All *Team* camera footage must be streamed live, from one camera feed, with no "cuts".
a. Pre-recorded Robot Skills Matches are strictly prohibited in a Live, Remote event.
b. *Driver*(s) are not restricted to a specific *Driver Station* and are permitted to move freely around the *Field*, provided that they do not obstruct the camera's views of their *Field*, *Robot*, Controller or any *Risers*.
c. A Stopwatch / Tournament Manager display that shows the match time must be on video the entire time during the match.
d. The camera must be able to move around the field, with no breaks or "cuts", so that it can verify standard *Head Referee* checks before and after the *Match*. These could include (but are not limited to) Starting Position placement, game and field element placements, and any necessary scoring verification.
    i. If this is not feasible due to a *Team's* equipment or facility limitations, a second camera stream must be used for these close-up checks. This is the only permissible exception to the "single-camera" rule set forth by <RSE7>, and *Teams* utilizing this exception should expect additional scrutiny.

<RSE8> Live, Remote Robot Skills Matches must include some live interaction between the *Team* and the *Head Referee*.
a. A *Driver* must pair their Controller to their *Robot* on video prior to each *Match*.
b. The *Head Referee* must ask the *Team* if they are ready, and the *Team* must respond verbally/visually on video.

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i. If the *Head Referee* needs to see a closer or different angle of the Robot Starting Position or any field elements, the *Team* must be able to satisfy this request, per <RSE7>.

c. The *Match* will begin with the *Team* member who is controlling their clock to give a countdown for the *Match* to start. This person does not need to be a *Driver*.

d. After the *Match*, *Teams* must move the camera per the *Head Referee's* instructions to verify scored game elements before the field is reset, per <RSE7>. The *Head Referee* will confirm to the *Team* verbally what is being counted.

i. <T1> still applies - the *Head Referee's* judgment based on what can be seen on camera is final, as it would if they were observing it in person. There are no video or photo replays in a Live, Remote Skills-Only Event.

One common example will be for a referee to ask a *Team* to move the camera over to a goal to show if *Risers* are properly scored in that *Goal*. The *Head Referee* will ask the *Team* a series of questions, and might ask for a couple of different camera angles, but once the referee makes a determination based on these questions and viewing angles, the referee's decision is final.

<RSE9> Match replays are at the discretion of the *Head Referee*. In addition to the examples provided in <G16>, live video circumstances (such as a video cutting out, or a *Match* timing error) could warrant a *Match* replay at the *Head Referee's* discretion.

<RSE10> Any violation of any rules will result in the *Match* score being recorded as zero. That *Match* will count as one of the *Team's* allotted *Matches*.

Skills-Only Event: Remote, Pre-Recorded

A "Remote, Pre-Recorded" Skills-Only Event is an event held exclusively via videos of Robot Skills Matches that are submitted to and scored by an *Event Partner* and/or *Head Referee*.

An official event utilizing this format requires prior approval from the REC Foundation, and should only be considered when no other event options are available in a given event region.

- Videos submitted for a Pre-Recorded Skills event must be recorded and submitted within the duration of the event set by the *Event Partner*. Videos recorded prior to the event's start date & time will not be acceptable.
- *Event Partners* will generate a set of unique, randomized alphanumeric code to be sent to each *Team* at the beginning of the Event.
- All video format rules set forth by <RSE7> apply. Furthermore, a second clock showing the current date / time must be on video during the entire *Match*.
- *Matches* should follow a standard procedure, done and shown on one video without any "cuts" or edits, in the following order:
  1. *Robot* Inspection is done by the *Team*, showing on video, the inspection sheet signed and completed. Measurements must be done using a measuring device such as a Robot Sizing Tool or tape measure.
  2. The *Team* says the random code that they were given by the *Event Partner* out loud on video while writing the code visibly on a paper or whiteboard.
  3. *Teams* pair the Controller to the *Robot*.
  4. The *Team* shows on video a closeup view of the Starting Position to provide video evidence that the *Robot* is in a legal starting position.
  5. The *Team* says out loud and writes on paper or whiteboard if they are attempting a *Programming Skills Match* or *Driving Skills Match*.
  6. The *Team* starts a *Match* when the clock begins.

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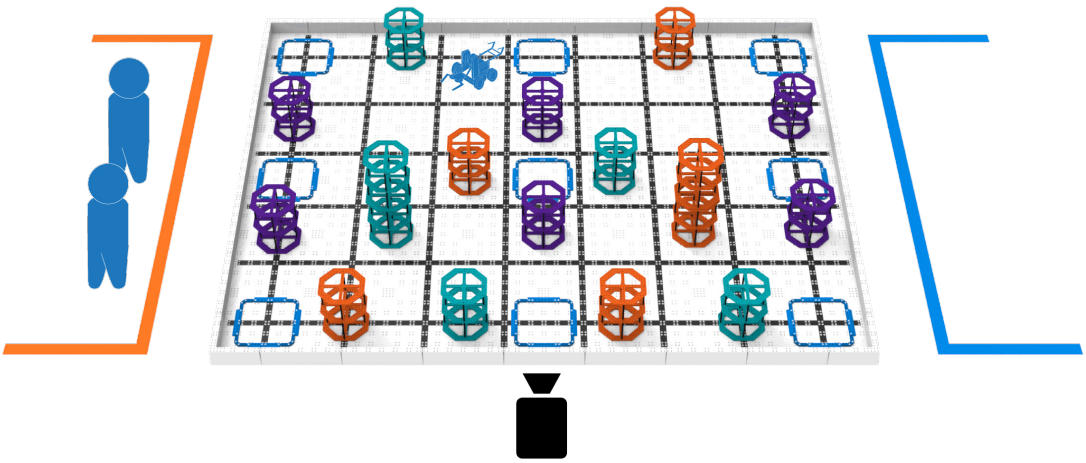
7. After the *Match*, the *Team* must move the camera to each of the *Goals* saying out loud what counts as scored and records onto an official referee scoresheet.
8. The scoresheet is then shown clearly on video for a minimum of 10 seconds. While the scoresheet is being recorded, *Teams* can reset the field for the next *Match*.
9. The *Team* can then repeat steps 3-8 for their remaining allotment of *Matches*, i.e. maximum of 3 *Programming Skills Matches* and 3 *Driving Skills Matches*, one after another on the same video recording.
10. The video recording can now be stopped.

- *Teams* will need to upload their video on a publicly accessible platform like YouTube, Facebook Video, Google Classroom, SchoolTube, etc and submit the URL to the *Event Partner* per the instructions on the event site.

Live Remote Tournament Rules

Live Remote Tournaments

Traditional VEX IQ Challenge events are held "in-person" in a classroom, school gymnasium, or community center. In the 2020-2021 season, *Event Partners* can also choose to hold an event entirely remotely, utilizing the RobotEvents.com Live Remote Tournament interface. More information about this interface can be found here: https://www.roboticseducation.org/covid-19-updates/



In a Live Remote tournament, the VIQC Rise Above Teamwork Challenge is played by an *Alliance* composed of two *Teams* operating under driver control. Each *Team* competes on a separate field (i.e. there are two *Robots*, two *Teams*, and two fields in each *Match*).

An *Alliance's* score at the end of a *Match* is calculated by combining the fields of each *Team*. The object of the game is to attain the highest score by Scoring and Stacking *Risers* in *Goals*, Completing Rows, and Completing Stacks.

Unless otherwise noted below, all rules in the standard Game Manual apply to Live Remote *Matches*.

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Live Remote Tournament Definitions

Goal Label - To aid in remote communication and scoring, each *Goal* has a *Goal Label*, as shown in Figure 20. These *Goal Labels* are laid out relative to the *Driver Stations* and audience view, and should be consistent between both fields. For example, if a *Head Referee* were to ask *Team* members to "point at Goal A", all *Team* members should point to the *Goal* in the top-left corner of the remote webcam feed.

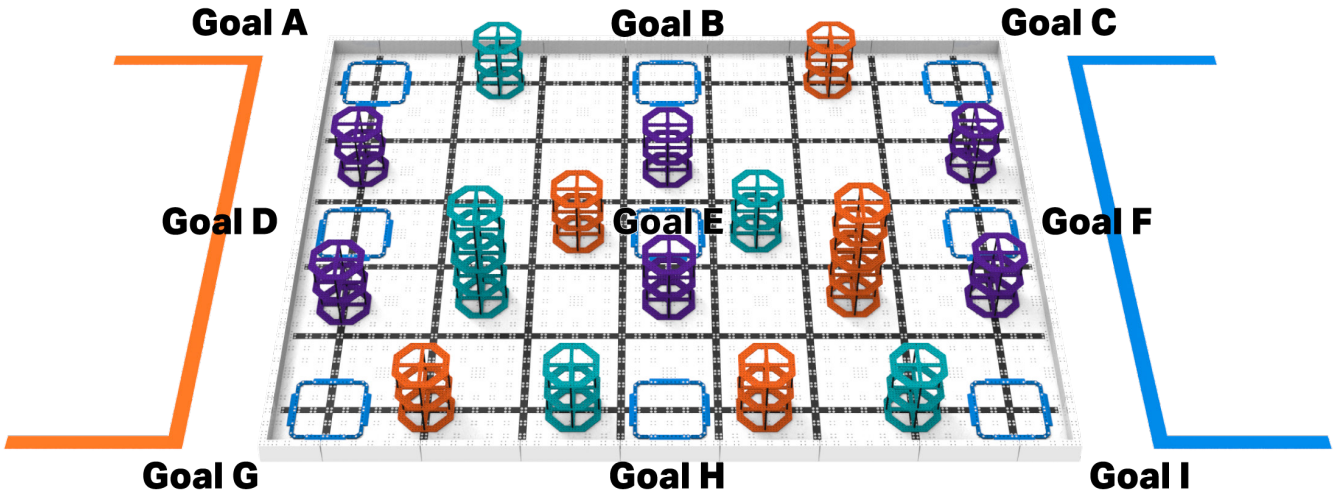


Figure 20: Goal Labels ***(from the Audience perspective)***

Live Remote Tournament Scoring

Live Remote *Matches* are scored as follows:

- A *Base Riser* is worth one (1) point.
- A *Stacked Riser* is worth one (1) point.
- A *Completed Row* is worth three (3) points.
- A *Completed Stack* is worth thirty (30) points.

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Live Remote Tournament Game Rules

<LRT1> The following rules from the Robot Skills Challenge Appendix, pertaining to a Remote Skills-Only event, also apply to Live Remote Tournaments events:

- <RSE5> - An *Adult Team* contact must be present in all *Matches*.
- <RSE6> - *Teams* will complete a full *Robot* inspection in accordance with <R3>, as well as a possible *Field* inspection at the *Event Partner's* discretion .
- <RSE7> - All *Team* camera footage must be streamed live, from one camera feed, with no "cuts".
  - A *Team's* camera must be placed on the "audience side" of the field, i.e. with the Orange *Driver Station* and *Goal* A on the left side of the screen.
- <RSE8> - *Matches* must include some live interaction between the *Team* and the *Head Referee*.
- <RSE9> - *Match* replays are at the discretion of the *Head Referee*.

<LRT2> This rule is an extension of rule <G8>. During a Live Remote Tournament *Match*, *Drivers* must still stand in a *Driver Station*.

During a *Match*, the *Drivers* in the *Driver Station* are the only *Team* members permitted to influence the operation of their *Robot*, either directly or indirectly. The intent of this rule is to prohibit "sideline coaching" from *Adults* or other *Students* who are in close proximity to the *Drivers*.

Drivers are permitted to utilize devices with communication features enabled while in the *Driver Station*. The intent of this rule is to allow *Drivers* to monitor the Live Remote video feeds of their partners. Using a device with communication features enabled to receive "sideline coaching" would still be a violation of this rule. Communication with an *Alliance* partner's *Drivers* is not considered a violation of this rule.

If *Drivers* are unable to stand in the *Driver Station* due to external circumstances in their remote environment, such as a wall, then they should inform the *Head Referee* of this constraint prior to the *Match*. Exceptions to that portion of this rule may be granted at the *Head Referee's* discretion. *Head Referees* are advised to give *Teams* the "benefit of the doubt" in this situation.

<LRT3> In a Live Remote Tournament *Match*, each field is set up with six (6) Orange *Risers*, six (6) Purple *Risers*, and six (6) Teal *Risers*, as shown below in figure 21. All other pre-*Match* setup rules, such as <G4> still apply.
Note: In a Live Remote Tournament, *Drivers* may stand in either of the *Driver Station* options shown in Figure 20.

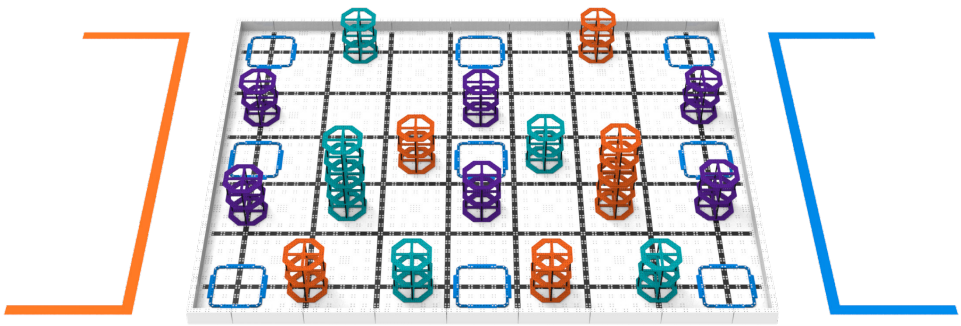


Figure 21: Field layout for a VIQC Rise Above Live Remote Teamwork Match

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<LRT4> To score *Risers* and Completed Rows, both Teams' fields are "combined".

Note: Similar to a normal Teamwork *Match*, only three (3) *Risers* can be considered as *Scored* for any particular *Goal Label*. Any additional *Risers* will not count as *Scored*. If there are different color *Risers* in the same *Goal Label* on each field, it would not be eligible for a *Completed Row* or *Completed Stack*

For all intents and purposes, you can picture the two Teams' fields being stacked on top of each other and scored as one "*Alliance* field". For example, if *Team* A has scored one of the three *Risers* needed for a *Completed Row*, and *Team* B has scored the other two, then this would be considered a valid *Completed Row* for the *Alliance*.

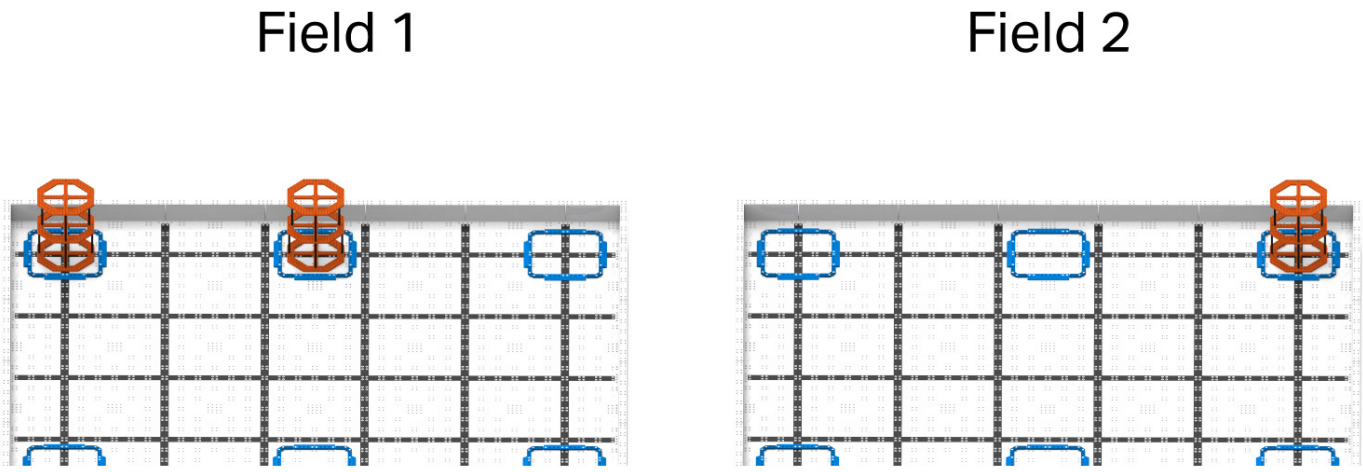


***Figure 22: This would be considered to be a** Completed Row*

<LRT5> To score a *Completed Stack*, the *Goal* must meet the criteria of a *Completed Stack* on one (1) Team's field.

a. <LRT5> applies to *Completed Stacks*. A *Completed Stack* must be within a *Completed Row*, but the *Completed Row* does not need to be contained within the same Team's field as the *Completed Stack*.

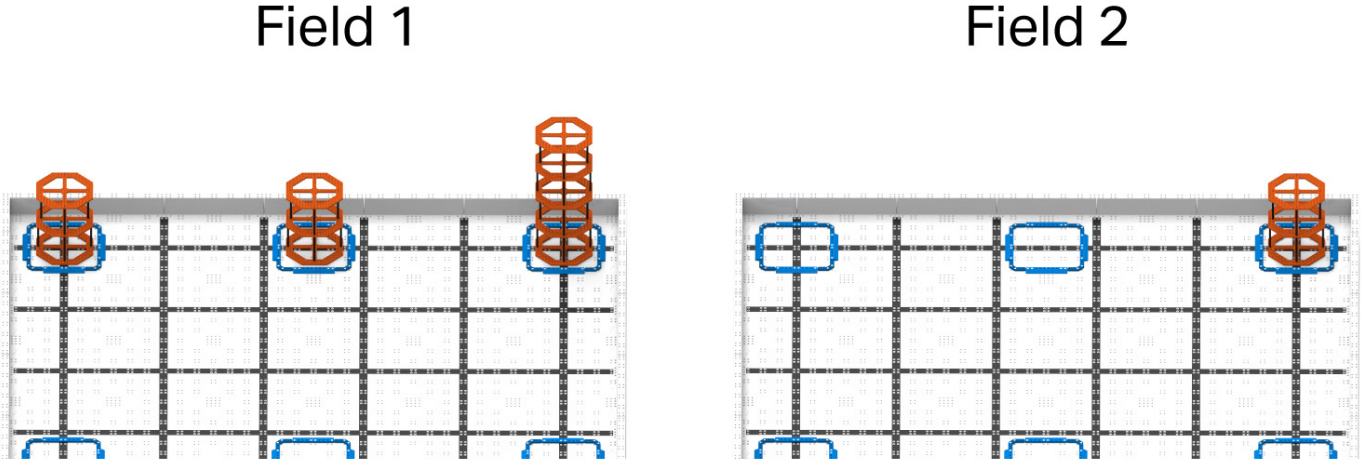


***Figure 23: This is not a valid** Completed Stack*

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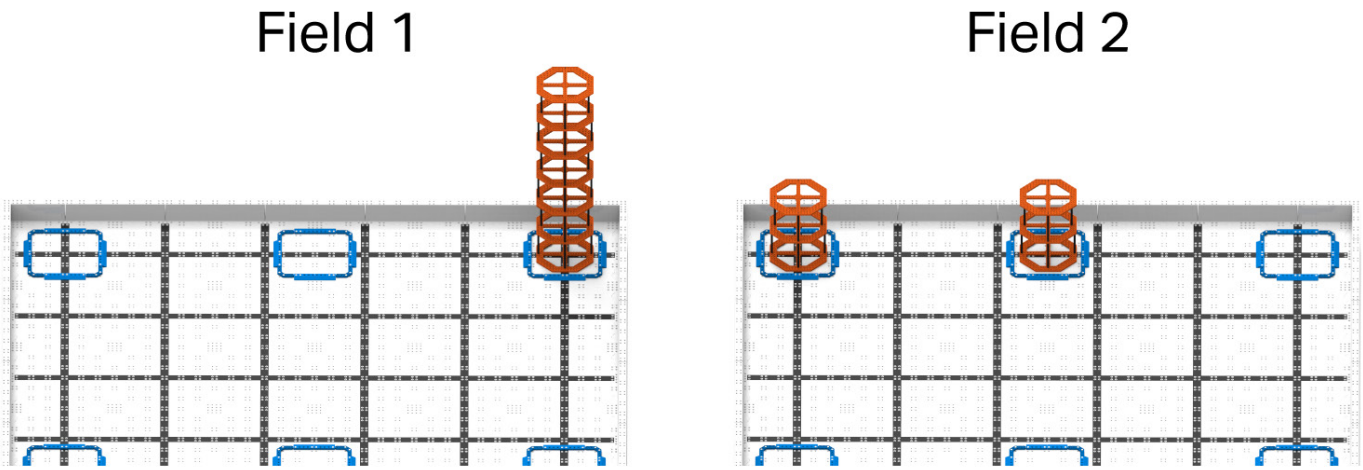


***Figure 24: This is a valid** Completed Stack*

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